Stoller
Hanford Office

DOE-EM/GJ683-2004

C4258
Log Data Report

Borehole Information:

Borehole: C4258			**Site:** East of U Tank Farm		
Coordinates (WA State Plane)		**GWL (ft)[1]:** 229.6		**GWL Date:** 06/01/04	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
Not Available	Not Available	06/01/04	Not Available	269	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	1.1	11 3/4	10 7/8	7/16	1.1	268

Borehole Notes:

Casing data were provided by Tim Hottell, the Fluor Field Team Leader.

Logging Equipment Information:

Logging System:	Gamma 2A		**Type:** SGLS (35%) 34TP20893A
Calibration Date:	03/2004	**Calibration Reference:**	DOE-EM/GJ642-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4- Repeat	
Date	06/02/04	06/03/04	06/07/04	06/07/04	
Logging Engineer	Pearson	Pearson	Pearson	Pearson	
Start Depth (ft)	106.0	268.0	171.0	106.0	
Finish Depth (ft)	0.0	170.0	107.0	80.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A[3]	N/A	N/A	N/A	
Pre-Verification	BA346CAB	BA347CAB	BA348CAB	BA348CAB	
Start File	BA346000	BA347000	BA348000	BA348065	
Finish File	BA346106	BA347098	BA348064	BA348091	
Post-Verification	BA346CAA	BA347CAA	BA348CAA	BA348CAA	
Depth Return Error (in.)	N/A	+2	+2	+2	

Log Run	1	2	3	4- Repeat	
Comments	Fine-gain adjustment after files 090 and 091.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

Logging Operation Notes:

Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. Zero reference is the ground surface.

Analysis Notes:

Analyst:	Henwood	Date:	06/07/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AMAR04.xls). Zero reference is the ground surface. The casing configuration was assumed as one string of 11-in. casing with a thickness of 7/16 in. to 268 ft (total logging depth). No dead time corrections were required. A correction for water in the 11-in. borehole was applied to the data below 229 ft.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the man-made radionuclide detected in this borehole. ^{137}Cs was detected near the ground surface at a maximum concentration of 1.3 pCi/g and at a few sporadic depth intervals throughout the borehole near its MDL of approximately 0.2 pCi/g.

The KUT logs showed changes corresponding to lithology. Apparent ^{232}Th concentrations are elevated by approximately 0.4 pCi/g in the interval between 125 and 135 ft, and this increase corresponds with fine-grained sediment of the Cold Creek Interval formerly known as the Early Palouse Soil. The relatively low ^{40}K and ^{232}Th values in the interval between 135 and 140 ft as well as the relatively high ^{238}U values are characteristic of the carbonate palesols of the Cold Creek Interval.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 1461 and 2614 keV. Naturally occurring ^{238}U as measured at the 1764-keV energy level indicates enhanced radon in the borehole during log run 4 relative to the measurements acquired in log run 1.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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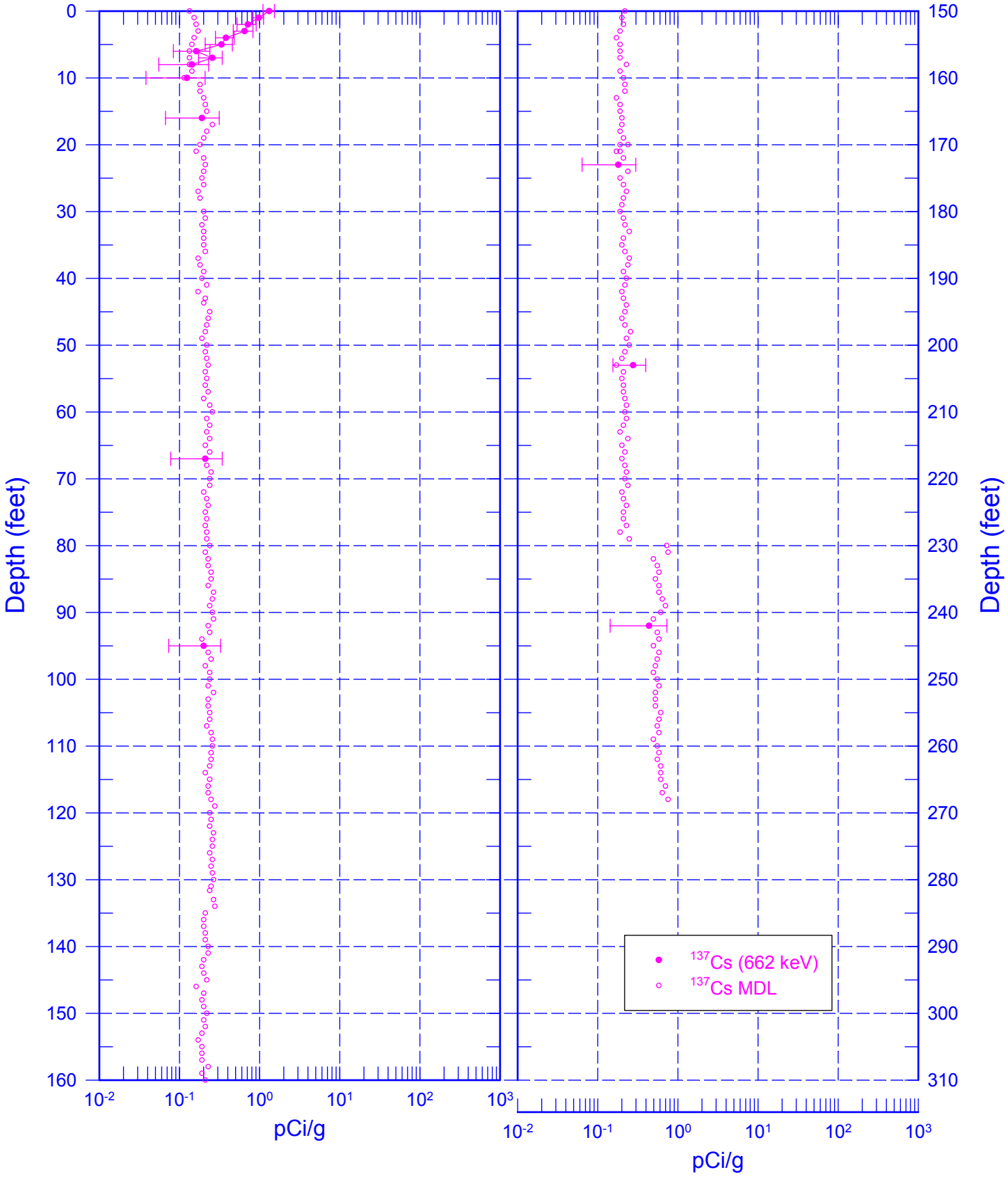
Man-Made Radionuclides



Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Log Date - 06/07/04

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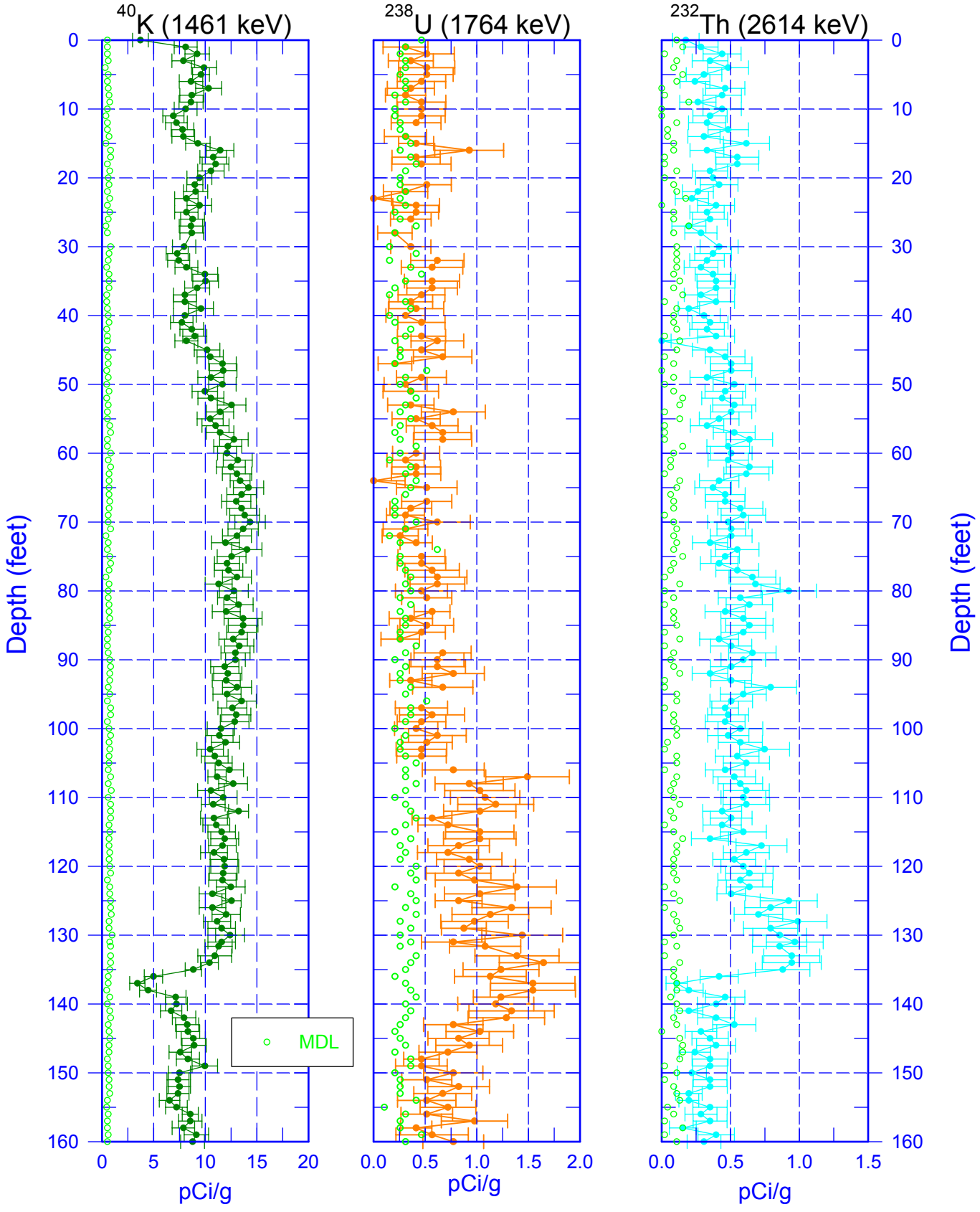
Natural Gamma Logs

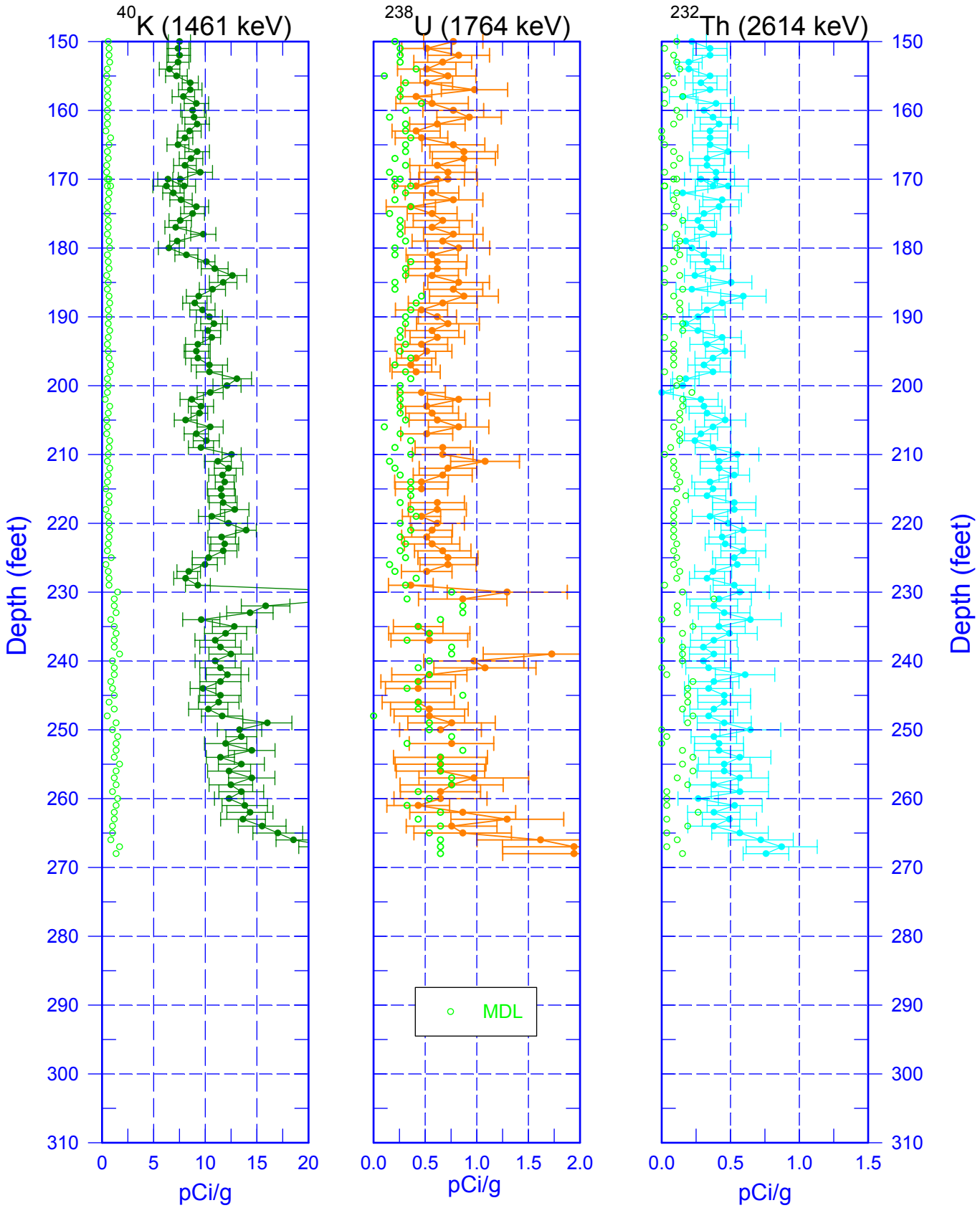


Zero Reference = Ground Surface

Depth scale: 1" = 20 ft

Last Log Date - 06/07/04

C4258
Natural Gamma Logs

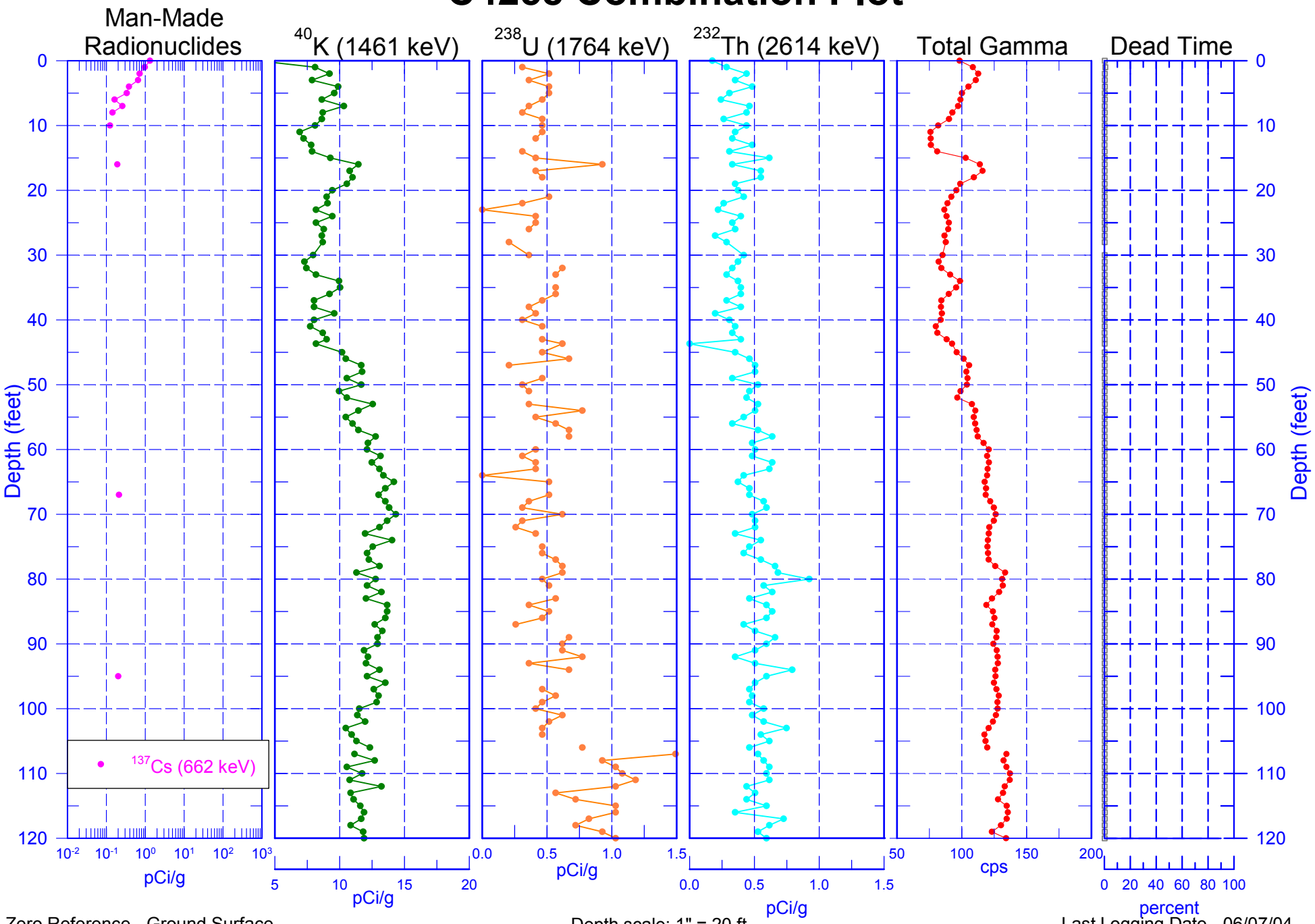


Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Log Date - 06/07/04

C4258 Combination Plot

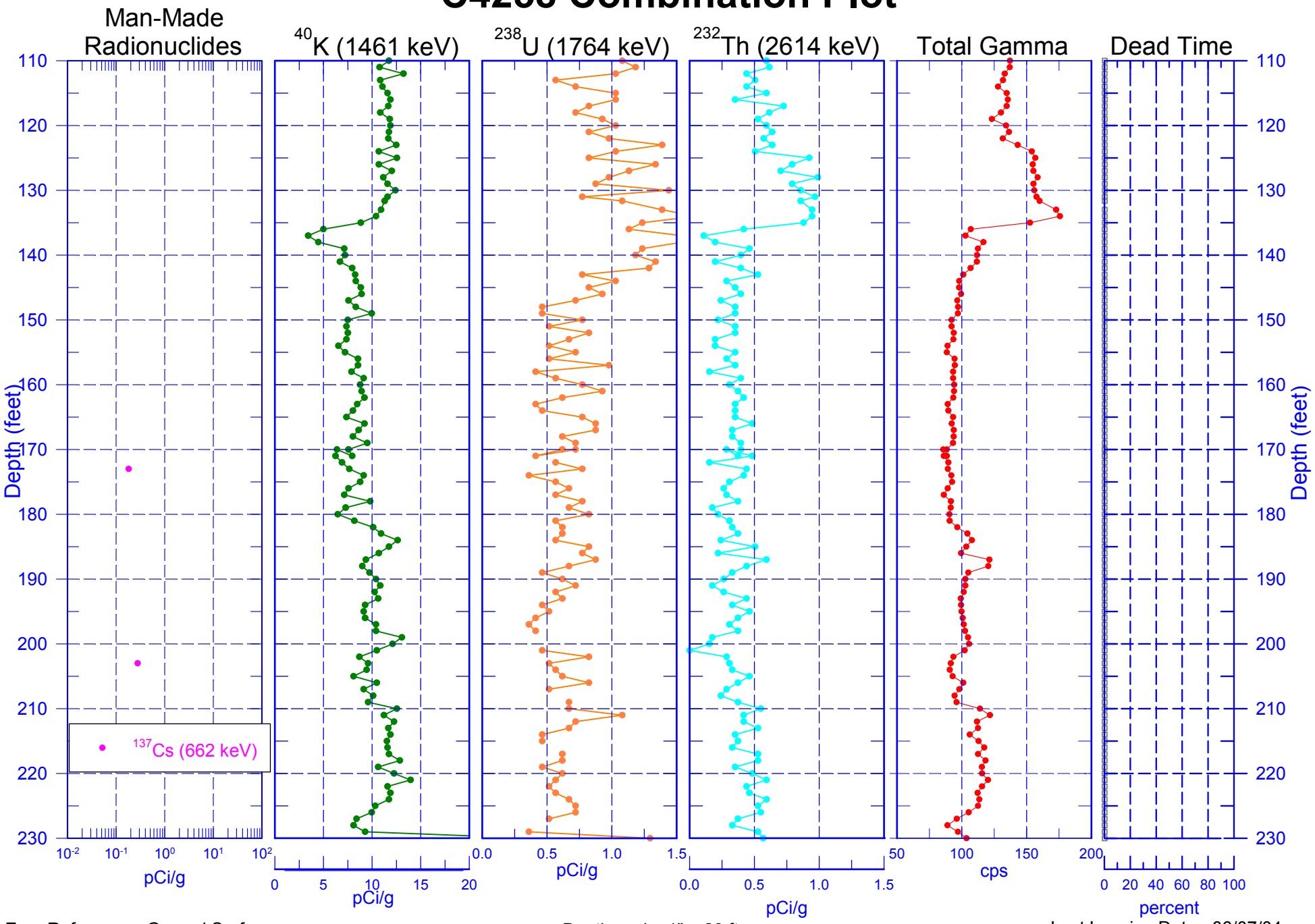


Zero Reference - Ground Surface

Depth scale: 1" = 20 ft

Last Logging Date - 06/07/04

C4258 Combination Plot



Zero Reference - Ground Surface

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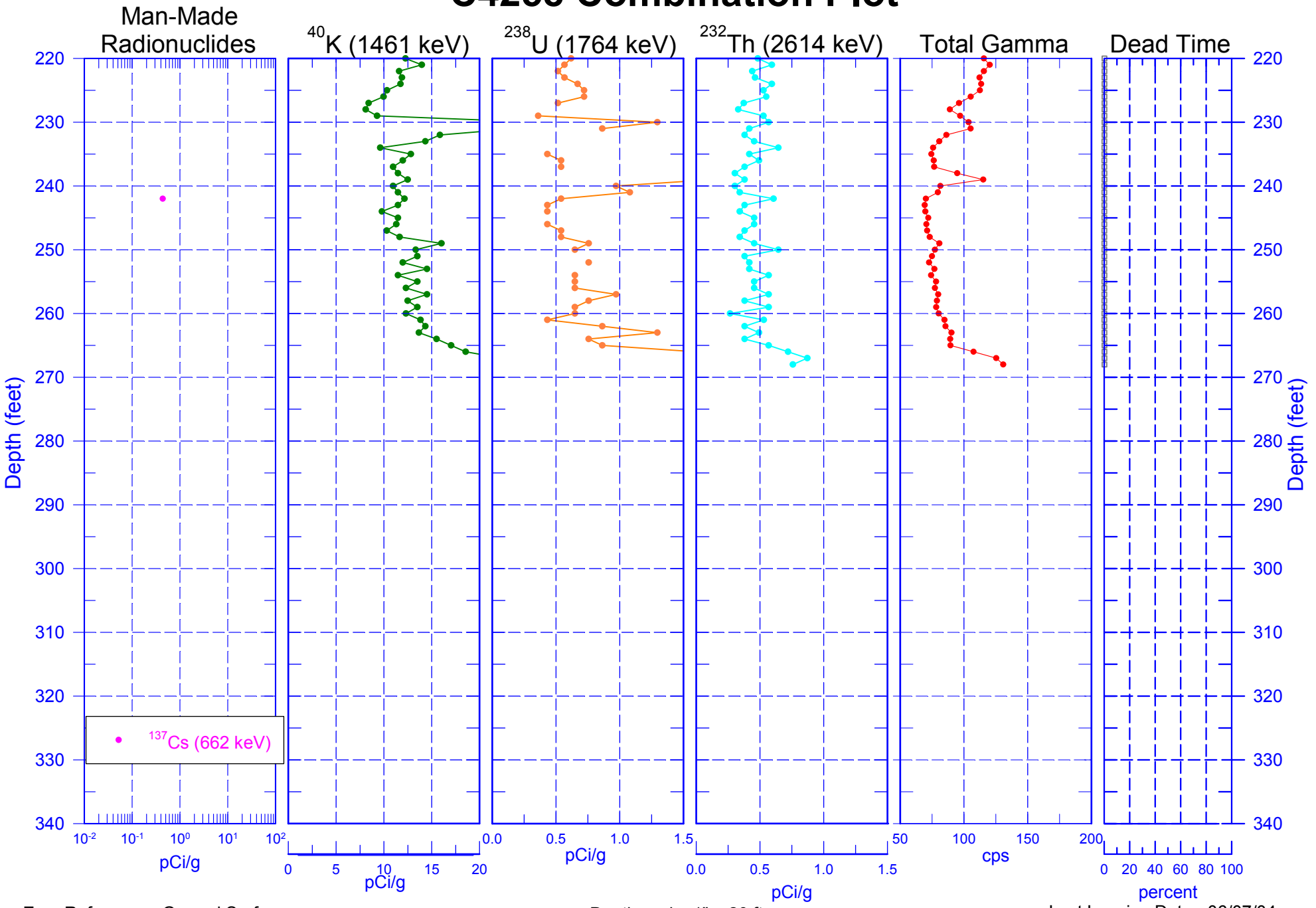
C4258 Combination Plot



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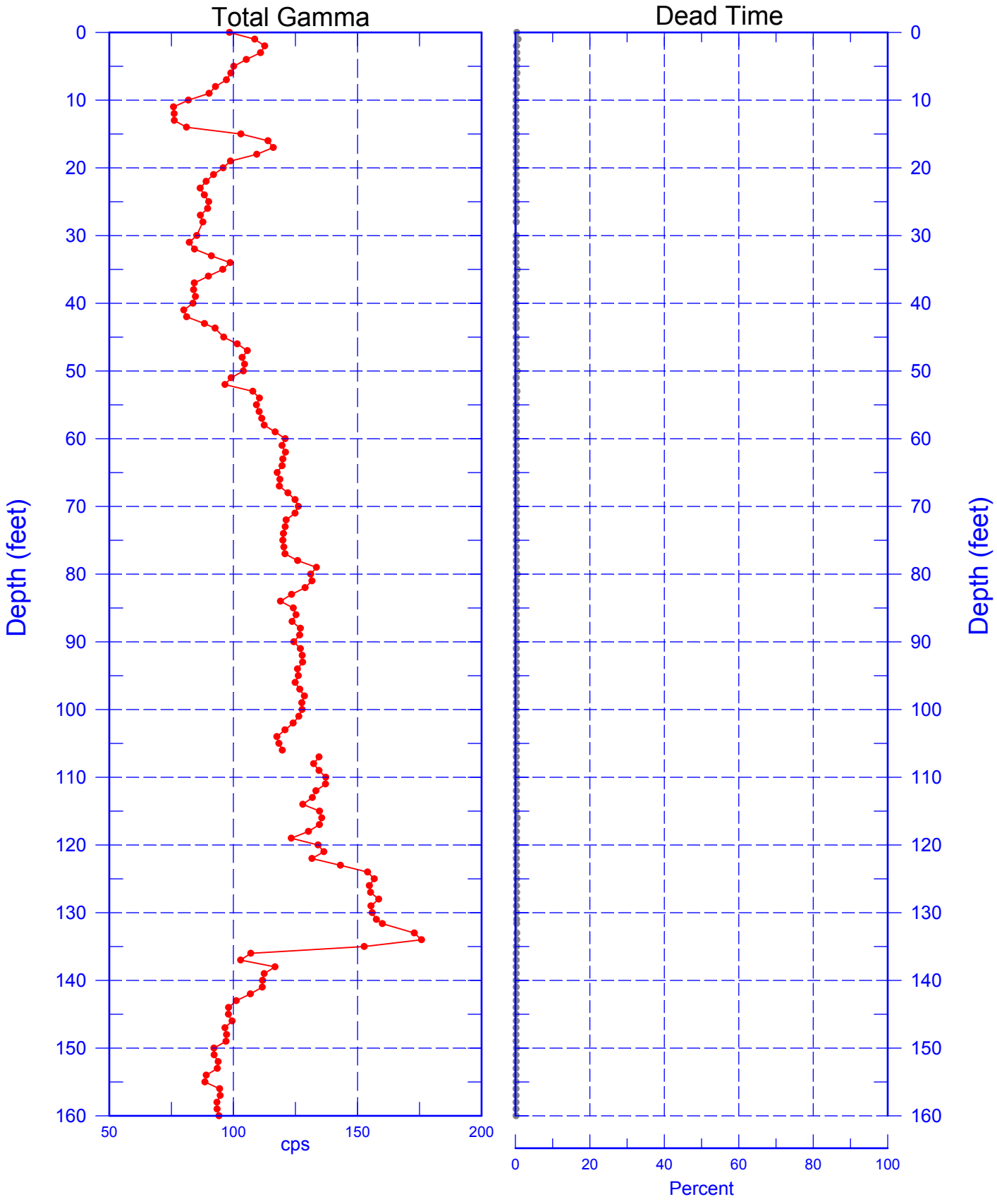
Total Gamma & Dead Time



Reference - Ground Surface

Depth scale: 1" = 20 ft

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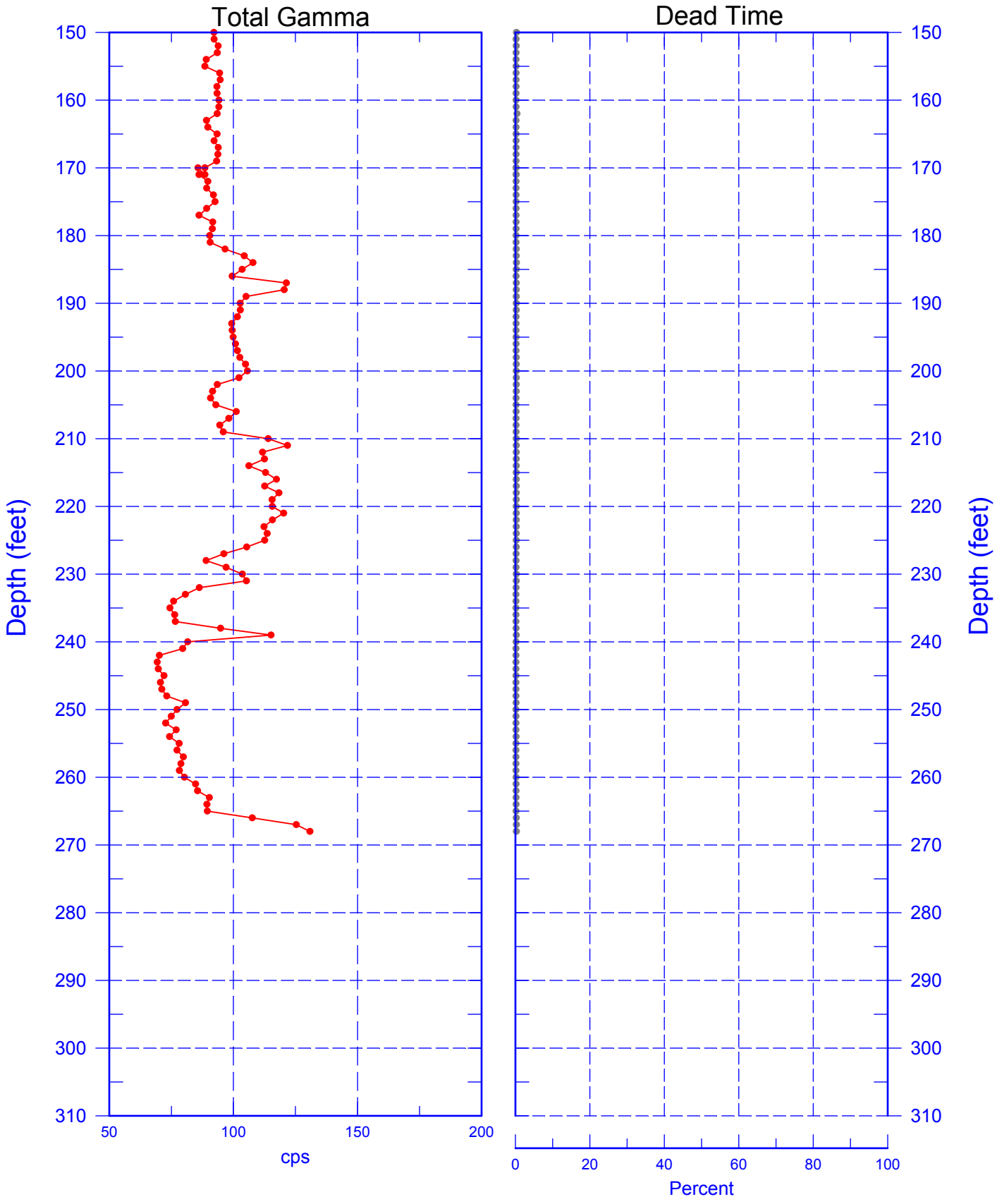
Total Gamma & Dead Time



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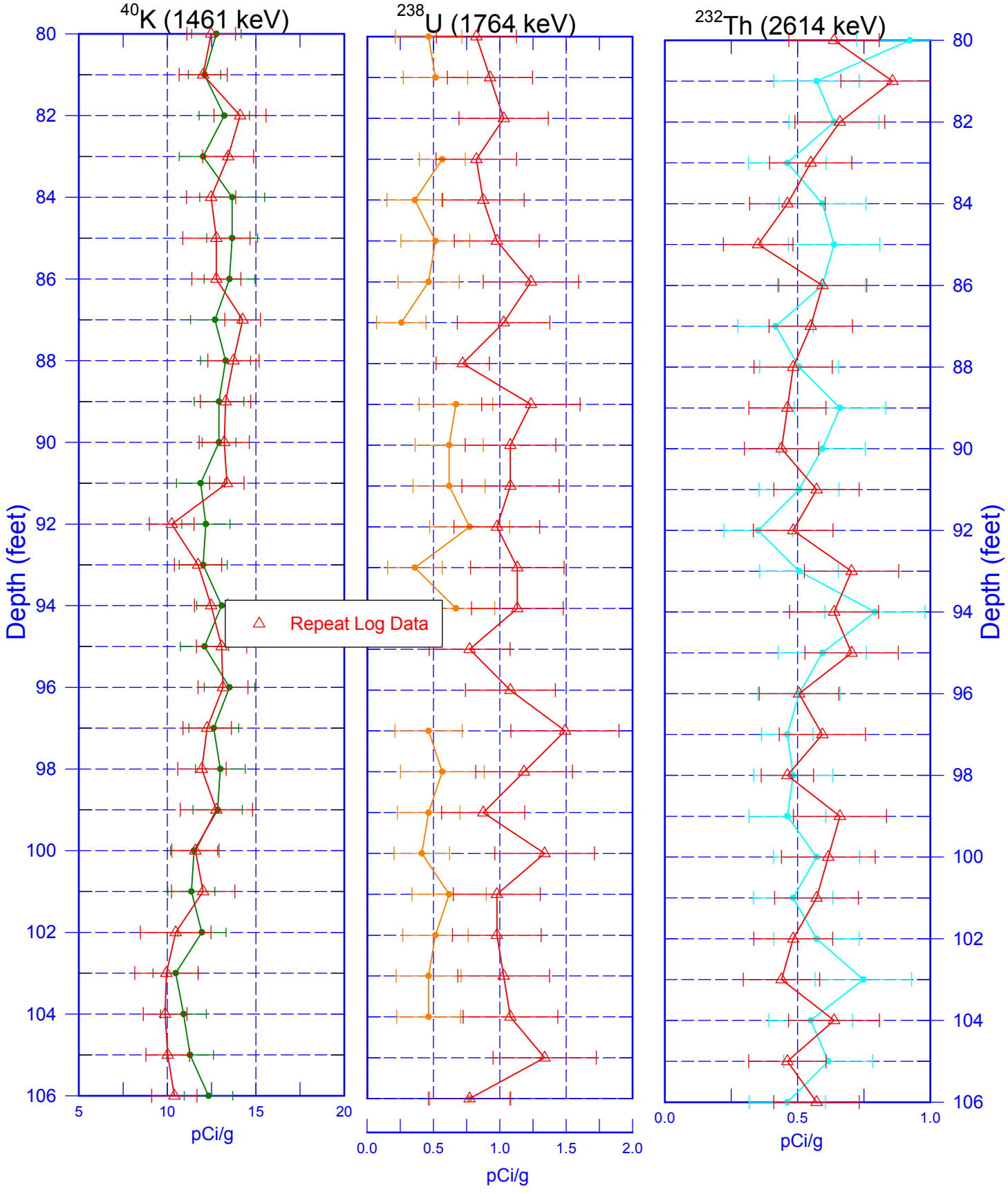
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Last Log Date - 06/07/04